

CLAIMS

What is claimed is:

1. A lens comprising:

- 5 a) a first surface for primarily performing a color correction function, the first surface including a diffraction efficiency improvement mechanism; and
b) a second surface for primarily performing the light ray bending function.

10 2. The lens of claim 1 wherein the diffraction efficiency improvement mechanism includes a diffractive portion of the first surface for increasing the diffractive efficiency of the lens; wherein the portion has a concave profile.

15 3. The lens of claim 1 wherein the diffractive portion of the first surface reduces the incident angle of at least one light ray with respect to the first surface, thereby increasing the diffractive efficiency of the lens.

4. The lens of Claim 1 wherein the lens has a spot size of less than about 5 microns for a full field of view of about 110 degrees.

20 5. The lens of Claim 1 further comprising:

c) an aperture; and

d) a focal plane;

wherein the distance between the aperture and the focal plane is less than about 6 mm.

25 6. The lens of Claim 1 further comprising:

a vignetting reducing mechanism for reducing the shadowing in the corners of an image.

7. The lens of Claim 6 wherein the vignetting reducing mechanism includes

a) an aperture positioned at a predetermined distance from the first surface of the lens; wherein the predetermined distance is a value that makes the lens telecentric.

8. The lens of Claim 6 wherein the vignetting reducing mechanism includes

a) an aperture positioned at a predetermined distance from the first surface of the lens; wherein the predetermined distance causes a chief ray to be generally perpendicular to the focal plane.

9. The lens of Claim 1 wherein the first surface is both aspheric and diffractive.

10. The lens of Claim 1 wherein the second surface is generally aspheric.

11. The lens of Claim 1 wherein the lens is made from one of a glass material and a plastic material; and wherein the lens includes one of zone plates, holographic lenses, kinoform lenses, binary optics, or a combination thereof.

12. A lens comprising:

a) a first optical means for primarily performing a color correction function, the first optical means including a diffraction efficiency improvement means; and

b) a second optical means for primarily performing the light ray bending function.

13. The lens of claim 12 wherein the diffraction efficiency improvement means includes a diffractive portion of the first optical means for increasing the diffractive efficiency of the lens; wherein the portion has a concave profile.

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14. The lens of claim 12 wherein the diffractive portion of the first surface reduces the incident angle of at least one light ray with respect to the first surface, thereby increasing the diffractive efficiency of the lens.

- 10 15. The lens of Claim 12 wherein the lens has a spot size of less than about 5 microns for a full field of view of about 110 degrees.

16. The lens of Claim 12 further comprising:

c) an aperture; and

- 15 d) a focal plane;

wherein the distance between the aperture and the focal plane is less than about 6 mm.

17. The lens of Claim 12 further comprising:

means for reducing the shadowing in the corners of an image.

18. The lens of Claim 17 wherein the means for reducing the shadowing includes

b) an aperture positioned at a predetermined distance from the first optical means of the lens; wherein the predetermined distance is a value that makes the lens telecentric.

19. The lens of Claim 17 wherein the means for reducing the shadowing includes

b) an aperture positioned at a predetermined distance from the first optical means of the lens; wherein the predetermined distance causes a chief ray to be generally perpendicular to the focal plane.

20. The lens of Claim 12 wherein the first optical means is both aspheric and diffractive and the second optical means is generally aspheric.